Module 2

It's Organic, Man!

Recycling at Home

It's Organic, Man!

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Module 2

Master Materials List

Student workbooks are used for every lesson. In nearly every lesson the white board and dry erase markers are used. Should you be inclined, transparencies can be made and used on an overhead projector with water based markers.

21	2L plastic soda bottles Remove the labels.
1	X-Acto knife
2	Pair nylon hose
30	Markers
7	Cotton balls
7	Cups shredded paper
17.5	Cups small kitchen waste
3.5	Cups dried leaves
3.5	Cups pencil shavings
7	TBL compost starter
7	Cups soil
14	Rubber bands
7	Cups water
1	Measuring cup
7	Reusable grocery bags
120	One gallon Zip-Lock bags
7	Mixing bowls
1	Diary of a Worm by Doreen Cronin
1	Container of 2lbs of red wigglers (or vermicomposting bin)
1	Roll of paper towels
30	Magnifying glasses
4	Newspapers
7	2 quart buckets
30	6in X 6in drywall patches
30	Sponges
7	Hand held strainers
7	Potato mashers
1	Roll waxed paper
1	Pair scissors
1	5 gallon bucket
1	Cross cut shredder
7	Plastic 1 gallon storage containers
30	Sheets paper
30	Sets colored pencils / crayons

Nevada Standard Alignment

M2-1s

Lesson	Title	Topic	Nevada Science	Nevada Language Arts	Nevada Geography	Nevada Mathematics
9	Breakin' It Down	Waste Characterization / Compost	**N.5.A.1, N.5.A.4, N.5.B.2, E.5.A.4, E.5.A.5, E.5.C.3, P.5.A.4, P.5.A.6, L.5.C.2, L.5.C.3, L.5.C.4**	7.5.1, 7.5.2, 7.5.3, 7.5.5, 8.5.1, 8.5.2, 8.5.4	2.5.4, 3.5.3, 5.5.1, 5.5.4, 6.5.4	5.5.1, 5.5.6
10	My Carrots Are Green	Compost	**N.5.A.6, N.5.B.2, E.5.A.4, E.5.A.5, P.5.A.4, P.5.A.6, L.5.C.2, L.5.C.3, L.5.C.4**	7.5.1, 7.5.2, 7.5.3, 7.5.5, 8.5.1, 8.5.2, 8.5.4	2.5.4, 3.5.3, 5.5.1, 5.5.4, 6.5.4	n/a
11	The Worms Ate My Homework	Vermicompost	**N.5.A.1, N.5.B.2, E.5.A.4, E.5.A.5, P.5.A.4, P.5.A.6, L.5.A.1, L.5.A.2, L.5.C.2, L.5.C.3, L.5.C.4**	7.5.1, 7.5.2, 7.5.3, 7.5.5, 8.5.1, 8.5.2, 8.5.4	2.5.4, 3.5.3, 5.5.1, 5.5.4, 6.5.4	n/a
12	It's My Paper, and I Like It	Paper Making	**N.5.A.6, N.5.B.2**	7.5.1, 7.5.2, 7.5.3, 7.5.5, 8.5.1, 8.5.2, 8.5.4	2.5.4, 4.5.6, 6.5.4	n/a
13	Thoreau Think Piece	Assessment	**Assessment**	Assessment	Assessment	Assessment
14	Thoreau Think Piece (part 2)	Assessment	**Assessment**	Assessment	Assessment	Assessment

Module 2

It's Organic, Man!

References

Lesson 9 – **Breakin' it Down**

United States Environmental Protection Agency. (2006). *Municipal Solid Waste in the United States: 2005 Facts and Figures (EPA530-R-06-011).*

United States Environmental Protection Agency. (2007). *Composting: Basic Information.* Retrieved June 2, 2008 from http://www.epa.gov/epaoswer/non-hw/composting/basic.htm

Lesson 10 – **My Carrots Are Green**

Freudenrich, Ph.D., Craig. (2001). *How Composting Works.* Retrieved June 3, 2008 from http://home.howstuffworks.com/composting.htm

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Lesson 11 – **The Worms Ate My Homework**

Cronin, Doreen. (2003). *Diary of a Worm.* New York: HarperCollins.

New York State Department of Environmental Conservation. (2006). *"RW" Goes to School: A Teachers Guide.* Albany, NY: New York State Department of Environmental Conservation.

Lesson 12 – **It's My Paper, and I Like It**

Technical Association of the Pulp and Paper Industry. (2001). *Making Paper by Hand.* Retrieved June 3, 2008 from http://www.tappi.org/paperu/art_class/makingPaper.htm

Lesson 13 – **Thoreau Think Piece**

Thoreau, Henry David. (1910). *Walden.* New York: C.E. Merrill Co.

Lesson 14 – **Thoreau Think Piece**

Discovery Education. (2007). *Discovery Education's Puzzlemaker*. Retrieved May 29, 2008 from http://puzzlemaker.discoveryeducation.com/

Thoreau, Henry David. (1910). *Walden.* New York: C.E. Merrill Co.

It's Organic, Man!

Lesson 9
Breakin' It Down!

Waste Characterization
Intro to Compost

Teaching Strategies

Breakin' It Down!

Waste Characterization
Intro to Compost

Teaching Strategies

Lecture

This strategy is effective for all levels of learners.

During the lecture, an alternative may be to use the overhead (use student worksheet as a transparency)

Worksheets

Worksheets are provided to guide the students through the lesson. The lead teacher may prefer the students to take their own notes.

For below level learners and special ed, the teacher may consider having the worksheets filled out for these students. This would be done before class by the teacher or by having an advanced student help.

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
20 minutes
Mini-lesson

Vocabulary:

Municipal Solid Waste (revisit from lesson 2)

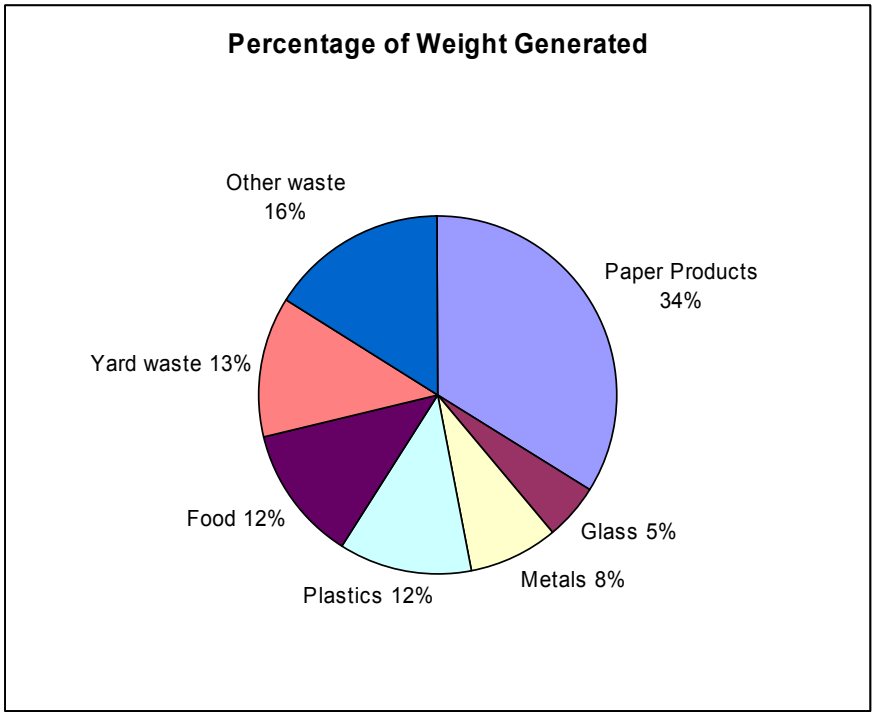
Waste Characterization Study

Environmental Protection Agency

Organic Compounds

Breakin' It Down!

Waste Characterization



Data from EPA document EPA530-R-06-011 October 2006

Objective

Students will understand that studies have been conducted to determine what makes up municipal solid waste.
Students will be able to identify of the categories of MSW generated can be recycled.

Materials Needed

30	Single subject notebooks
6	Dry erase markers
1	White board

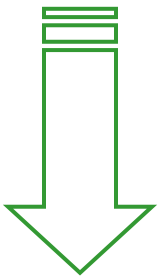
Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will understand that studies have been conducted to determine what makes up municipal solid waste.

Objective: You will be able to identify which of the categories of MSW generated can be recycled.

Distribute handouts (or workbooks).



Introduction:

"Let's take a quick look at the types of things people throw away and in what amounts."

Modeling / Guided Practice

1. Have the students take out their notebooks.
2. Ask the students if they know what a characterization study is. Explain.
3. Write the chart (included—mention the info is from the EPA) on the board.
4. As you write the information on the board, have the students copy the information into their notebooks.
5. Explain that you can also write the info from the chart in a pie graph.
6. Draw pie graph on board.

Modeling / Guided Practice

7. As you write the information on the board, have the students copy the information.
8. Be dynamic as you write important bits of information on the board, interact and discuss.
9. Point out the materials that will be discussed in the rest of the program. Identify recyclable materials.
10. Focus now on combining the Yard Waste and Food Scraps. They are all organic compounds.
11. Generally, organic compounds can be composted.

Closure:

1. Transition into composting.

Independent Practice

1. Not applicable for this lesson. This flows into part 2 of lesson.

Lesson Time:
35 minutes
Mini-lesson

Breakin' It Down!

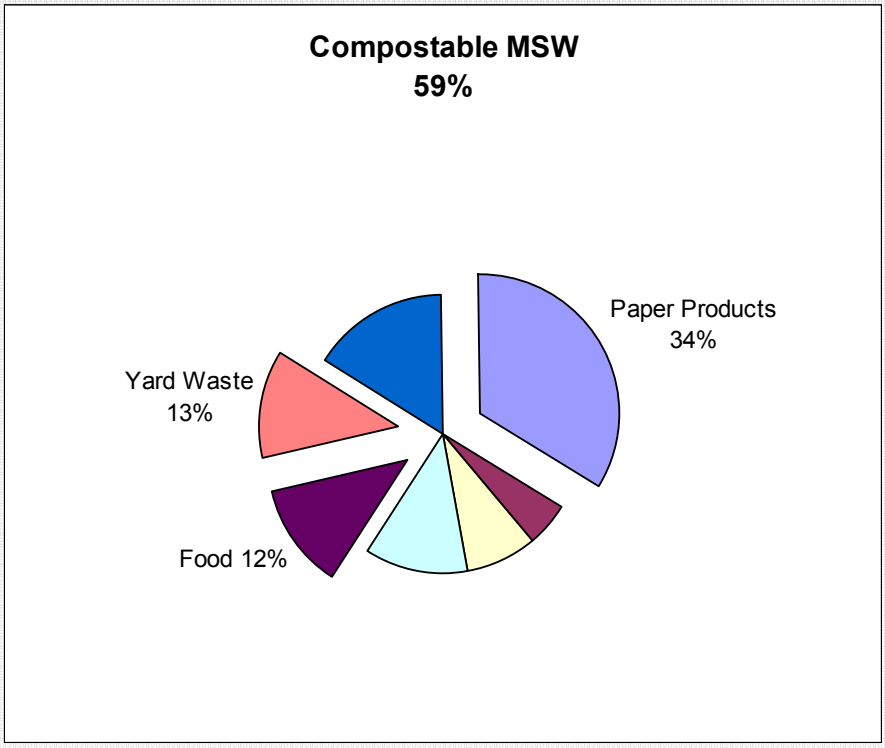
Intro to Compost

Vocabulary:

Compost

Decompose (revisit from lesson 4)

Biodegrade (revisit from lesson 4)



Objective

Students will be able to identify what types of materials can be composted and what cannot. Students will recognize that for efficient composting, there must be a balance of materials.

Materials Needed

30	Single subject notebooks
6	Dry erase markers
1	White board

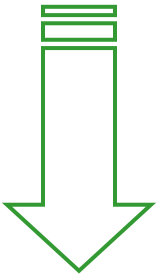
Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will be able to identify what types of materials can be composted and what cannot.

Objective: You will recognize that for efficient composting, there must be a balance of materials.

Distribute handouts (or workbooks).



Introduction:

Transition from part 1of lesson. The previous mini-lesson ended with organic materials in the waste stream.

Modeling / Guided Practice

1. Have the students take out their science notebooks.
2. Ask students to define compost. If they do not come up with the definition, write it on the board. Have the students copy it into their notebooks.
3. Ask the students to tell you the kinds of items that go into a compost pile. Write some answers on the board. Have the students copy the answers into their notebooks.
4. Ask the students to tell you the kinds of items that should not go into a compost pile. Write some answers on the board. Have the students copy them into their notebooks.

Modeling / Guided Practice

5. Why can't these items go into the compost pile? Write some answers on the board. Have the students copy them into their notebooks.
6. Explain that all organic matter decomposes.
7. Explain the need for balance to get the best decomposition rate.
8. Write down the formula that you will use for the compost column that will be constructed during next class. Have the students copy it into their notebooks.

Closure:

1. Take a few minutes to do a quick review of composting.
2. Check for understanding.
3. Let the students know that in the next class period the balancing of "browns" and "greens" will be discussed.

Independent Practice

1. Not applicable.

Support Document

Vocabulary

Breakin' It Down!

Waste Characterization
Intro to Compost

Vocabulary

Municipal Solid Waste: Trash (or garbage) generated by people and industry

Waste Characterization Study: A study performed in order to find out how much and what types of waste are thrown away.

Environmental Protection Agency: A federal agency dedicated to helping the environment. They set rules and regulations for how waste can and should be disposed.

Organic Compounds: Includes items that are living, have once lived, or are made from living things.

Decompose: The process that an item goes through to break down into its smallest elements**.**

Biodegrade: The process that an item goes through to break down into its smallest elements, through the use of micro-organisms.

Compost: The result of decomposition of organic material. It is generally used for fertilizer or soil conditioning.

Support Document

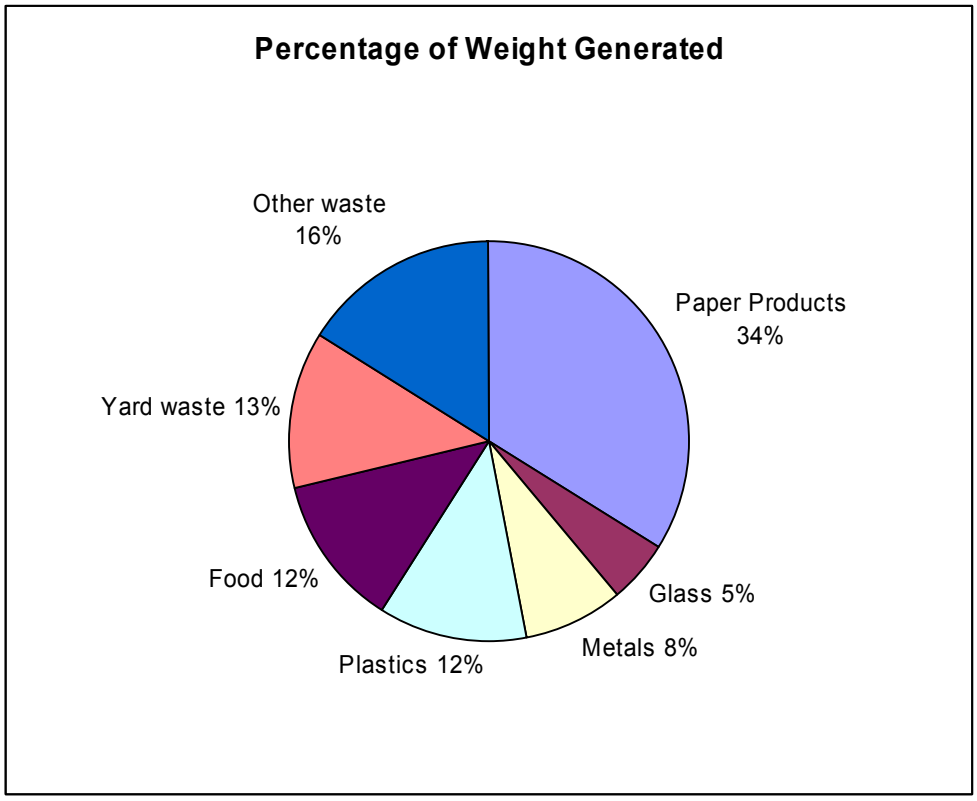
Breakin' It Down!

Waste Characterization
Intro to Compost

Support Document

Material	Weight generated (millions of tons PER YEAR)	Percent of Total Waste
Paper products	84	34%
Glass	12.8	5%
Metals	18.7	8%
Plastics	28.9	12%
Food	29.2	12%
Yard waste	32.1	13%
Other	39.96	16%
Total	245.7	

Data from EPA document EPA530-R-06-011 October 2006


Percentage of Weight Generated
Other waste 16%
Paper Products 34%
Yard waste 13%
Food 12%
Glass 5%
Metals 8%
Plastics 12%

Support Document

Breakin' It Down!

Waste Characterization
Intro to Compost

Compost Pile

Items that can go in a compost pile

Grass clippings and leaves.
Newspapers.
Kitchen waste
Fruits and vegetables
Woody material

Items that can NOT go in a compost pile
Meats
Dairy products
Vegetables cooked with animal fats
Animal fat

Human and pet fecal matter

These items will attract vectors!

Will make humans and pets sick!

Support Document

Breakin' It Down!

Waste Characterization
Intro to Compost

Compost Column Formula

Formula to use in compost column

2 1/2 cups bagged salad (greens)
1/2 cup dried leaves (browns)
1/2 cup pencil shavings (browns)
1 cup shredded paper (browns)
1 cup water
1 cup soil

1 tablespoon compost starter (microorganisms)

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 9

Breakin' It Down! **Date:**_____

Objectives:	I will understand that studies have been conducted to determine what makes up municipal solid waste. I will be able to identify which of the categories of MSW generated can be recycled. I will be able to identify what types of materials can be composted and what cannot. I will recognize that for efficient composting, there must be a balance of materials.

Vocabulary:

Municipal Solid Waste:

Waste Characterization Study:

Environmental Protection Agency:

Organic Compounds:

Decompose:

Biodegrade:

Compost:

Solid Waste and Recycling Curriculum **Name:_____**

Lesson 9

Breakin' It Down! **Date:_____**

Waste Characterization:

Chart:

Material	Weight Generated (millions of tons PER YEAR)	Percent of Total Waste
TOTAL		100

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 9

Breakin' It Down! **Date:**_____

Please draw a pie chart representing the information in the Waste Characterization table.

Pie Chart:

Which of the categories above can be composted?

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 9

Breakin' It Down! **Date:**_____

_____

List some items that can be composted.

_____

List some items that cannot be composted.

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 9

Breakin' It Down! **Date:**_____

Write the formula for next session's compost column.

Breakin' It Down! **Date:**_____

It's Organic, Man!

Lesson 10
My Carrots Are Green

Compost
Compost Column Building

Support Document

My Carrots Are Green

Compost Column Construction

Support Document

Preparing materials for making the column.

Materials Needed

21	2L plastic soda bottles Remove the labels.
1	Scissors or X-Acto knife
2	Pair nylon hose
1	Marker
7	Cotton balls
7	Cups shredded paper
17.5	Cups small kitchen waste
3.5	Cups dried leaves
3.5	Cups pencil shavings
7	TBLs compost starter
7	Cups soil
14	Rubber bands
7	Cups water
1	Measuring cup
7	Reusable grocery bags
56	1-gallon Zip-Lock bags

For a class size of 30, prepare kits for 7 compost columns.

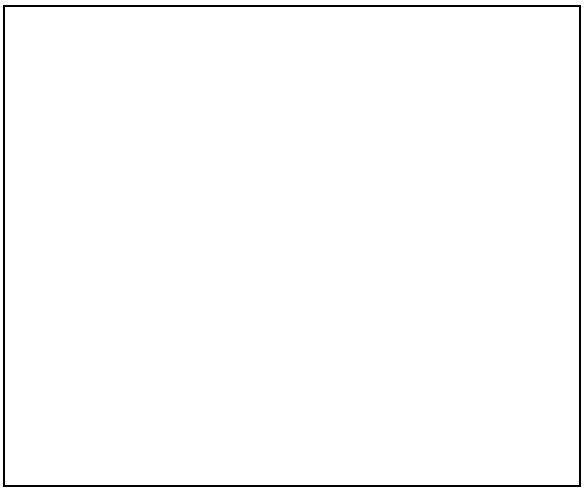
The class will be divided into 6 groups of 5.

The 7th compost column will be made by the teacher (as a demonstration).

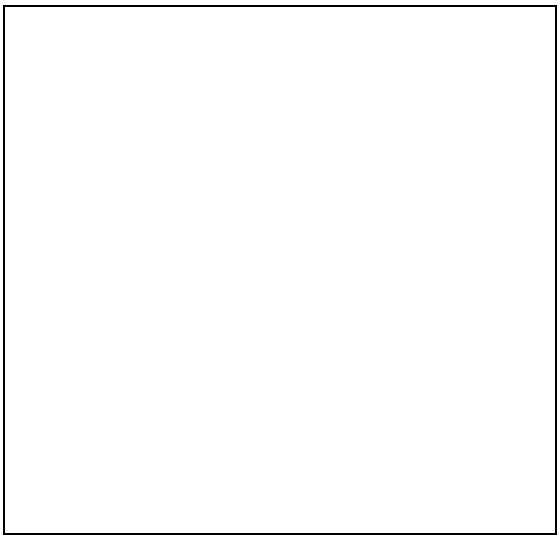
Support Document

Preparing the plastic soda bottles for the compost column

1. Mark where the bottom cut will be made on bottle #1(Just below the taper).

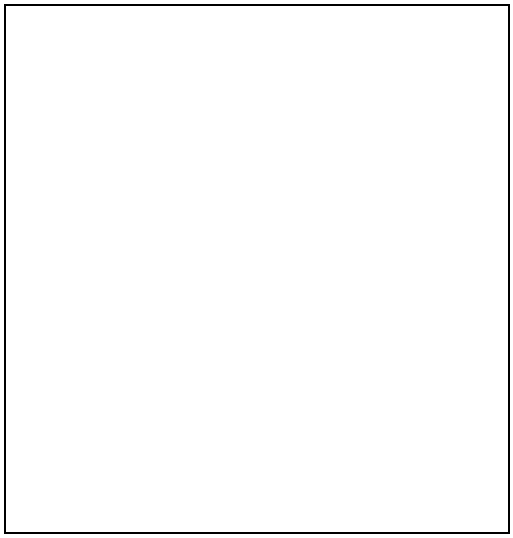


2. Use the scissors or X-Acto knife to remove the bottom.
3. Write #1 on the finished product.

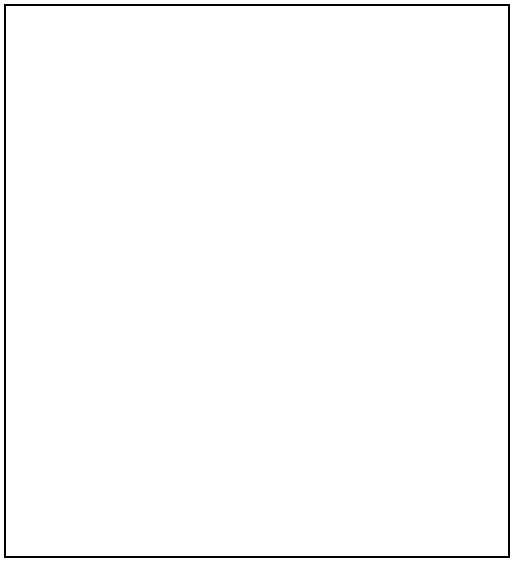


Support Document

4. Mark where the bottom cut will be made on bottle #2. (Slightly above the midpoint)

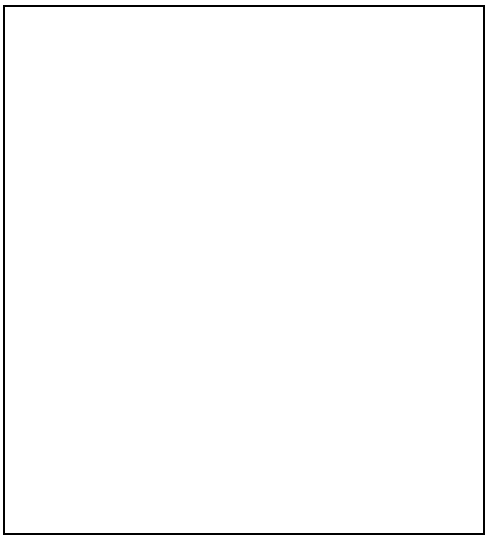


5. With the scissors or X-Acto knife, cut off the bottom.
6. Write the #2 on the finished product.

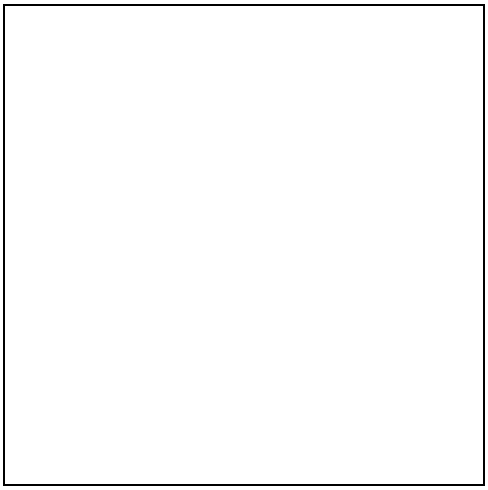


Support Document

7. Mark where the bottom cut will be made on bottle #3. (Below the base tapers)

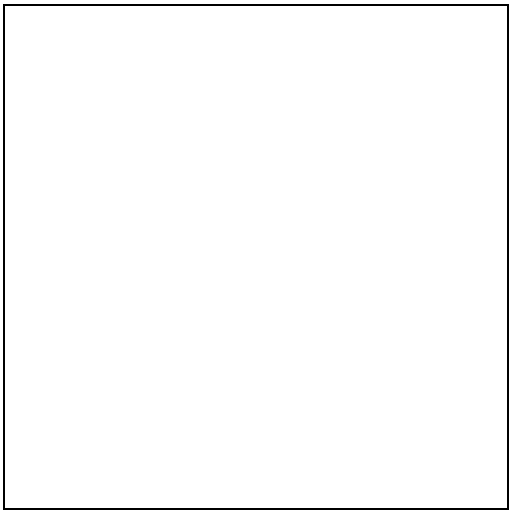


8. With the scissors or X-Acto knife, cut the bottom off.
9. Write the #3 on the finished product.

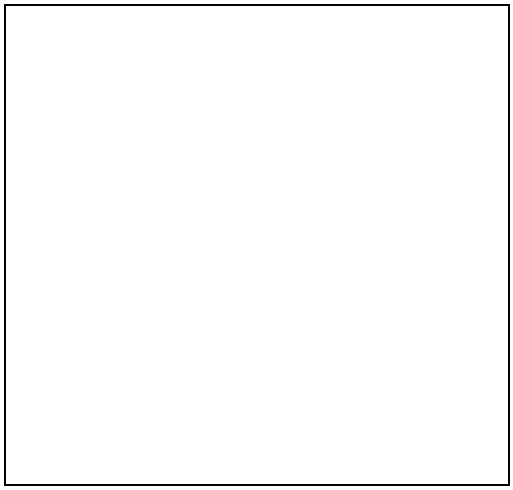


Support Document

10. Cut the nylon hose into 2” squares (14 squares needed)

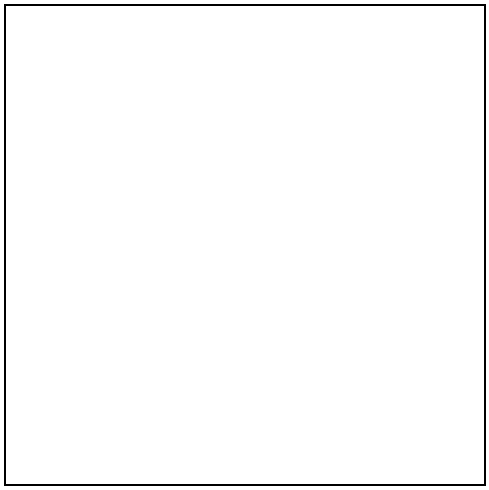


11. Place 1 cotton ball into the neck of bottle #2.
12. Using the rubber bands, attach the nylon squares to the neck of bottle #2.



Support Document

13. Using the rubber bands, attach the nylon squares to the neck of bottle #3.



Prepare the contents of the landfill column

14. Measure 1 cup of shredded paper into each of 7 Zip-Lock bags.
15. Measure ½ cup of pencil shavings into each of 7 Zip-Lock bags.
    (Sawdust or any finely ground woody material can be substituted.)

16. Place ½ cup dried leaves into each of 7 Zip-Lock bags.
17. Place 2 ½ cups kitchen waste into each of 7 Zip-Lock bags.
    (Include carrots and other colored vegetables to reinforce the fact that "greens" are not just green)
    Chop kitchen waste finely.
    Avoid fruits if possible—fruit flies will appear in the column

18. Measure 1 cup of water into each of 7 Zip-Lock bags.
19. Measure ½ cup of soil into each of 14 Zip-Lock bags.
20. Measure 1 TBL of compost starter into each of 7 Zip-Lock bags.

Support Document

21. Prepare the individual compost column kits in reusable grocery bags by placing the following items in each one:

- 1 compost column
- 1 Bag of shredded paper
- 1 Bag of water
- 2 Bags of soil
- 1 Bag of dried leaves
- 1 Bag containing pencil shavings
- 1 Bag containing kitchen waste
- 1 Bag containing compost starter

Teaching Strategies

My Carrots Are Green

Compost

Teaching Strategies

Lecture

This strategy is effective for all levels of learners.

During the lecture, an alternative may be to use the overhead (use student worksheet as a transparency)

Worksheets

Worksheets are provided to guide the students through the lesson. The lead teacher may prefer the students to take their own notes.

For below level learners and special ed, the teacher may consider having the worksheets filled out for these students. This would be done before class by the teacher or by having an advanced student help.

Group Makeup

Groups should be selected by the lead classroom teacher. The groups should be heterogeneous and learners of all levels should be included.

Group Discovery

The group work is effective for all levels of learners

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
20 minutes
Mini-lesson

My Carrots Are Green

Compost

Vocabulary:

Organic matter

"Greens"

"Browns"

"Nature's Helpers"

Greens: Greens are organic matter containing large amounts of Nitrogen.
They are generally items that are freshly cut.
They are also most of the food scraps that you would throw away from your kitchen (fruits and vegetables).

Objective

Students will compare and contrast: "browns" and "greens."
Students will discover the importance of air, water, organic matter and "nature's helpers" in composting.

Materials Needed

30	Single subject notebooks
6	Dry erase markers
1	White board

Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

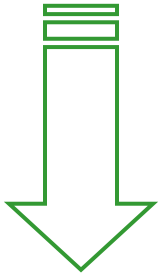
Objective: You will compare and contrast: "browns" and "greens."

Objective: You will discover the importance of air, water, organic matter and "nature's helpers" in composting.

Distribute handouts (or workbooks).

Introduction:

"Last time we looked at a pie graph that showed how MSW is broken down. We also said that paper, yard waste, and food can be composted. Let us look a little more closely at some factors that affect composting."



Modeling / Guided Practice

1. Have the students keep their science notebook out.
2. Discuss the importance of air in composting.
3. Discuss the importance of water in composting.
4. Discuss the importance of organic material in composting.
5. Define “browns” and “greens.”
6. Define “nature’s helpers.”
7. Discuss the role “nature’s helpers” play in composting.

Closure:

1. Stress the importance of composting.
2. Review the formula for completing the compost column.
3. Summarize the lesson.
4. Check for understanding.

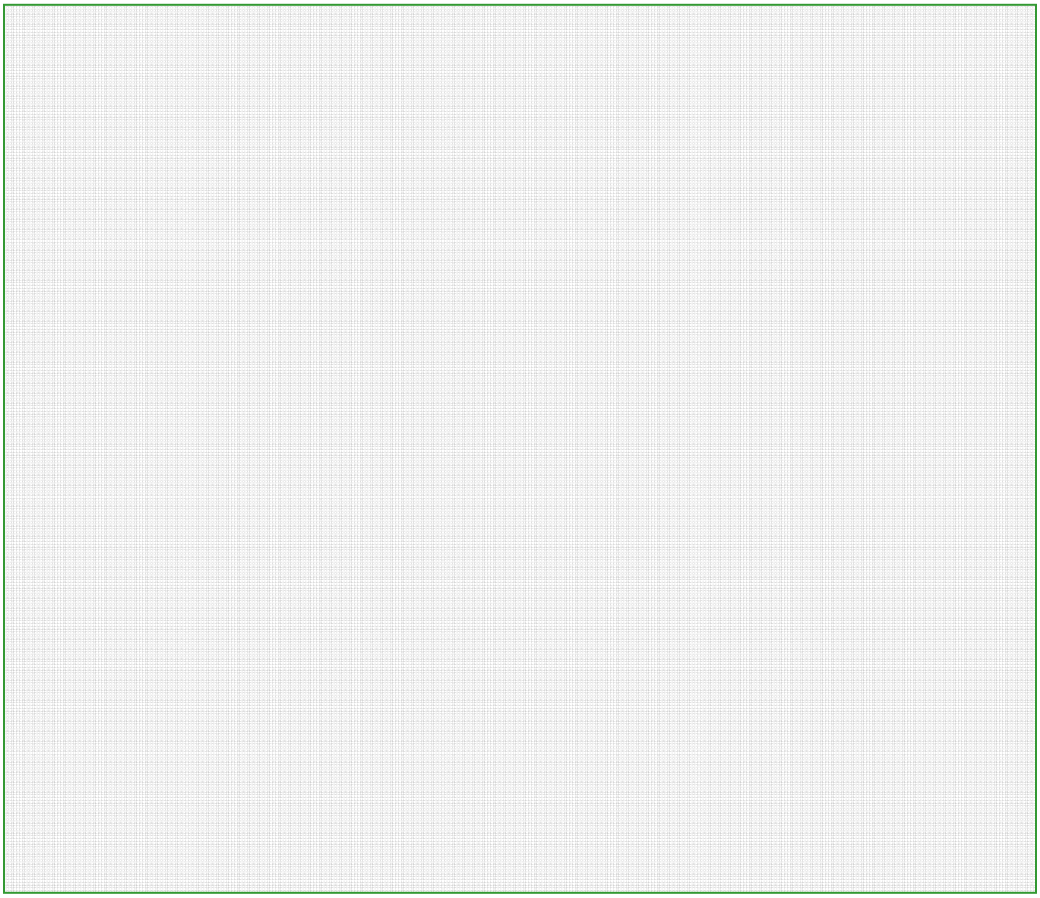
Independent Practice

1. Not applicable.

Lesson Time:
40 minutes

My Carrots Are Green

Compost Column Building



Objective

Students will construct a compost column.

Materials Needed

30	Single subject notebooks
6	Dry erase markers
1	White board
1	Support document
7	Prepackaged reusable bags containing materials used to make landfill model.
7	Mixing bowls

Anticipatory Set

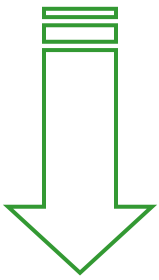
Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will construct a compost column.

Distribute handouts (or workbooks).

Introduction:

Transition from first mini-lesson. This lesson will allow the students to put all of the concepts of composting together.



Modeling / Guided Practice

1. Have the students assemble into preselected groups of 5.
2. Pass out the prefilled reusable grocery bags.
3. Pass out the mixing bowls.

Prepare the compost materials.

4. Hold up the bag of kitchen waste. Ask the students if it is "browns" or "greens." (The correct response is "greens.")
5. Pour the bag into the mixing bowl.
6. Have the students do the same.

7. Hold up the bag of leaves. Ask the students if it is "browns" or "greens." The correct response is "browns."
8. Pour the leaves into the mixing bowl.
9. Have the students do the same.

10. Mix ingredients with your hands.
11. Have the students do the same.

12. Hold up the bag of paper. Ask the students if it is "browns" or "greens." The correct response is "browns."
13. Pour the paper into the mixing bowl.
14. Have the students do the same.

15. Mix ingredients with your hands.
16. Have the students do the same.

17. Hold up the bag of pencil shavings. Ask the students if it is "browns" or "greens." The correct response is "browns."
18. Tell the students that in this model, the pencil shavings represent woody material. Also make the connection with the classroom.
19. Pour the pencil shavings into the mixing bowl.
20. Have the students do the same.

21. Mix ingredients with your hands.
22. Have the students do the same.

23. Select the bag of compost starter. The compost starter contains the bacteria and enzymes that we discussed earlier as "nature's helpers."
24. Pour the compost starter into the mixing bowl.
25. Have the students do the same.

26. Mix ingredients with your hands.
27. Have the students do the same.

28. Set the mixing bowl aside.

<u>Assemble the compost column</u>

29. Assemble the bottom of bottle #1 with the top of bottle #2 to form the body of the column. (This is to show the students how the model will fit together.)
30. Have the students do the same.

31. Add 1 cup of soil to the model to represents the ground.
32. Have the students do the same.

33. Carefully scoop the mixture in the mixing bowl into the column.
34. Have the students do the same.

35. Add 1 cup of soil to the model to act as a cover layer.
36. Have the students do the same.

37. Hold up the bag of water.
38. Slowly pour the water into the compost column.
39. Have the students do the same.

40. Attach bottle #3 to the top of the column. (Show the students how the model will fit together.)
41. Have the students do the same.

DISCUSSION

42. Draw attention to the holes poked in bottle #2 and bottle #3 of the column. Ask the students why they are there.
43. Reinforce the importance of air.
44. Ask if there is organic matter in the column.
45. Reinforce the importance of organic matter.
46. Ask about moisture in the column.
47. Reinforce the importance of moisture.
48. Ask about "nature's helpers." (compost starter)
49. Reinforce the importance of bacteria and enzymes.

50. Complete the student worksheets

Closure:

1. Take a few moments to do a quick review of the compost column.
2. Check for understanding.

Independent Practice

1. Not applicable.

Support Document

Vocabulary

My Carrots Are Green

Compost

Vocabulary

Organic Matter: Organic matter, the things we discussed last time are central to the composing process. It is the food in the process.

Greens: Greens are organic matter that contain large amounts of Nitrogen. They are items that are freshly cut. They are also most of the food scraps that you would throw away from your kitchen (fruits and vegetables).

Browns: Browns are items that contain large amounts of Carbon. These are woody type matter including dried leaves, dead plants, and paper.

Nature's Helpers: Nature's helpers are microorganisms, worms, and insects. They all help break down the organic matter in the compost pile. Microorganisms include bacteria, fungus, and enzymes.

Formula to use in compost column

2 1/2 cups bagged salad (greens)
1/2 cup dried leaves (browns)
1/2 cup pencil shavings (browns)
1 cup shredded paper (browns)
1 cup water
1 cup soil

1 TBL compost starter

Support Document

Air and Water

My Carrots Are Green

Compost

Compost

Compost is the result of the process of decomposition of organic material. It is generally used for fertilizer or soil conditioning.

Air

Air is important tothe decomposition process. Decomposition happens when microorganisms break down the organic matter. In order for microorganisms to survive, they need to have air.

Lack of air is one reason that items do not decompose in a landfill.

Water

Microorganisms also need water to survive. Water is also important because other organisms like worms and insects are comfortable in moist environments. These other organisms are important in the decomposition process.

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 10

My Carrots Are Green **Date:**_____

Objectives:	I will compare and contrast "browns" and "greens." I will discover the importance of air, water, organic matter, and "nature's helpers" in composting. I will construct a compost column.

Vocabulary:

Organic Matter:

Greens:

Browns:

Nature's Helpers:

Composting:

Why is air important in composting?

Why is water important in composting?

My Carrots Are Green

Date:_____

Why is organic matter important in composting?

Green material contains lots of Nitrogen. Name some items that would be considered "greens."

Brown material contains lots of Carbon. Name some items that would be considered "browns."

"Nature's Helpers" help with the decomposition process. Name some items that would be considered "Nature's Helpers."

Compare and contrast "browns" and "greens."

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 10

My Carrots Are Green **Date:**_____

Formula:

2 1/2 cups bagged salad
1/2 cup dried leaves
1/2 cup pencil shavings
1 cup shredded paper
1 cup water
1 cup soil

1 TBL compost starter

List the green material in the formula.

List the brown materials in the formula.

List the "Nature's Helpers" in the formula.

List the organic materials in the formula.

My Carrots Are Green **Date:**_____

It's Organic, Man!

Lesson 11
The Worms Ate My Homework

Vermicomposting

Teaching Strategies

The Worms Ate My Homework

Vermicomposting

Teaching Strategies

Lecture

This strategy is effective for all levels of learners.

During the lecture, an alternative may be to use an overhead projector (usestudent worksheet as a transparency)

Worksheets

Worksheets are provided to guide the students through the lesson. The lead teacher may prefer the students to take their own notes.

For below level learners and special ed, the teacher may consider having the worksheets filled out for these students. This would be done before class by the teacher or by having an advanced student help.

Lab / Individual Discovery

The group work is effective for all levels of learners

Whole Group Discussion

Many lead teachers have popsicle sticks with students names on them for "random" selection of students. Use the name sticks to draw names to answer whole group discussion questions. In this lesson, this strategy is to be used during closing exercises.

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
60 minutes

The Worms Ate My Homework

Vermicomposting

Vocabulary:

Vermicomposting

Red Wigglers

Anterior

Posterior

Clitellum

Segments

**"I forgot my lunch today.
I got so hungry that I ate
my homework."**

The above quote was taken from Doreen Cronin's Diary of a Worm.

Objective

Students will be able to draw connections between standard composting and vermicomposting. Students will explore the anatomy of Red Wigglers.

Materials Needed

30	Workbooks (or handouts)
1	Diary of a Worm by Doreen Cronin
1	White board
1	Set of dry erase markers
1	Container of 2lbs of Red Wigglers (or vermicomposting bin)
1	Roll of paper towel
30	Magnifying glass

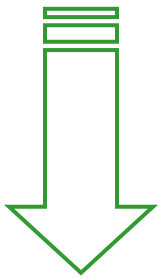
Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will be able to draw connections between standard composting and vermicomposting.

Objective: You will explore the anatomy of Red Wigglers.

Distribute handouts (or workbooks).



Introduction:

"Today we are going to talk about Vermicomposting. We will start by reviewing the important concepts of composting."

"We will then read a picture book called Diary of a Worm by Doreen Cronin."

"We are going to follow that with an exploration of Red Wigglers. Red Wigglers are the worms that we use for composting."

Modeling / Guided Practice

1. Have the students refer back to the previous two lessons.
   Review the important concepts of composting.

2. Teacher Read-Aloud.

Modeling / Guided Practice

3. Have the students draw their attention to their workbooks.
4. Provide instruction for the activity to follow.
   Read and explain all of the questions the students are to answer.

5. Pass out *damp* paper towels and the magnifying glasses.

REMIND THE STUDENTS THAT WORMS ARE ANIMALS AND ARE NOT TO BE HARMED

6. Provide each student with at least 1 worm and some vermicompost.

7. Have the students fill out their worksheets. Scaffold for support.
8. When the students are done, collect the materials. Worms and the paper towels may be deposited back in the worm bin.

Closure:

1. Discuss the findings of some of the students.
2. Compare vermicomposting with regular composting.

Independent Practice

1. Not applicable for this lesson.

Support Document

Vocabulary

The Worms Ate My Homework

Vermicomposting

Vermicompost: Compost is the result of the process of decomposition of organic material. It is generally used for fertilizer or soil conditioning. **Worms are used. The worm castings (manure) are a vital part of the soil's nutrition.**

Red Wiggler: The type of worm that is used in composting. It is smaller than the average earthworm and has a reddish color to it.

Anterior: The front end, or head of a worm.

Posterior: The back end, or tail of a worm.

Clitellum: The swollen section of a worm. It plays an important part in reproduction.

Segments: The many rings a worm has that contract and expand during movement.

Support Document

Lesson 10 review definitions

The Worms Ate My Homework

Vermicomposting

Organic Matter: Organic matter, the things we discussed last time are central to the composing process. It is the food in the process.

Greens: Greens are organic matter that contain large amounts of Nitrogen. They are items that are freshly cut. They are also most of the food scraps that you would throw away from your kitchen (fruits and vegetables).

Browns: Browns are items that contain large amounts of Carbon. These are woody type matter including dried leaves, dead plants, and paper.

Nature's Helpers: Nature's helpers are microorganisms, worms, and insects. They all help break down the organic matter in the compost pile. Microorganisms include bacteria, fungus, and enzymes.

Air: Air is important because of the decomposition process. Decomposition happens when microorganisms break down the organic matter. In order for microorganisms to survive, they need to have air.

Water: The microorganisms described above also need water to survive. Water is also important because other organisms like worms and insects are comfortable in moist environments. These other organisms are important in the decomposition process

Items that can go in a compost pile

Grass clippings and leaves.
Newspapers.
Kitchen waste
Fruits and vegetables
Woody material

Items that can NOT go in a compost pile

Meats
Dairy products
Vegetables cooked with animal fats
Animal fat

These items will attract vectors!

Human and pet fecal matter

Will make humans and pets sick!

Support Document

Student Worksheet Key

The Worms Ate My Homework

Vermicomposting

The anterior (head end) of the Red Wiggler is narrower than the posterior (tail end)

What color is the anterior? **Dark reddish purple**
What color is the posterior? **Pinkish with yellow**.

The clitellum is the swollen section of the worm that is responsible for reproduction.
If your worm does not have a visible clitellum, see if your shoulder partner's has one.

Which end is the clitellum, closer to? **The head**

Red Wigglers are made up of many rings called segments.
Compare your worm to your neighbor's.

Which worm has more segments? **Answers will vary but in general, the longer worm. As a worm matures, it gets longer and develops more segments**

Lightly touch the worm's anterior.

What does it do? **It contracts abruptly**

Lightly touch the worm's posterior.

What does it do? **It contracts.**

How does the worm feel to you when you touch it? **Answers vary**

When the worm moves forward, does it move head first or tail first?
Head first

Put some bedding material near the worm. Watch the worm for 1- 2 minutes.

Describe the worm's activity. **Answers vary**

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 11

The Worms Ate My Homework **Date:**_____

Objectives:	I will be able to draw connections between standard composting and vermicomposting. I will explore the anatomy of red wigglers.

Vocabulary

Vermicomposting:

Red Wigglers:

Anterior

Posterior

Clitellum

Segments

The anterior (head end) of the Red Wiggler is narrower than the posterior (tail end).

What color is the anterior?

What color is the posterior?

The Worms Ate My Homework **Date:**_____

The clitellum is the swollen section of the worm that is responsible for reproduction.

If your worm does not have a visible clitellum, see if your shoulder partner's worm has one.

Which end is the clitellum closer to?

Red Wigglers are made up of many rings called segments.

Compare your worm to your neighbor's.

Which worm has more segments?

Lightly touch the worm's anterior.

What does it do?

Lightly touch the worm's posterior.

What does it do?

How does the worm feel to you when you touch it?

When the worm moves forward, does it move head first or tail first?

The Worms Ate My Homework **Date:**_____

Put some bedding material near the worm. Watch the worm for 1- 2 minutes.

Describe the worm's activity.

It's Organic, Man!

Lesson 12
It's My Paper, And I Like It

Paper Making

Support Document

Pre-class prep

Materials Prep

It's My Paper, And I Like It

Paper Making

Pre-class prep

For a class of 30 students,

Prepare 6 paper making kits

Preparing the materials

Materials Needed

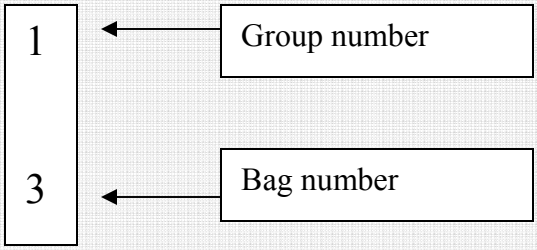
2	Newspapers
6	2-quart buckets
30	6in X 6in drywall patches
30	Sponges
6	Hand-held strainers
6	Potato mashers
1	Roll waxed paper
30	Markers
60	Zip-Lock bags
1	Pair scissors
6	Paper grocery bags

Zip-Lock bag prep

1. Place a sponge in each bag.
2. Place a drywall patch in each bag.
3. Place a sharpie in each bag.
4. Label the outside of each bag with the contents.

5. Divide the bags into groups of 5 (there should be 6 groups).
6. In the upper right hand corner of each Zip-Lock bag, write the group number. (There should be five 1s, five 2s, five 3s, etc.)

7. Within each group, label the bags 1 through 5. Write the number just below the group number.



Waxed paper prep

8. From the roll of waxed paper, cut 30 squares approximately 6" X 6".

9. Place the waxed paper into Zip-Lock bags.

Paper grocery bag prep

10. Label the bags 1 through 7 with a marker.

11. Place the group 1 Zip-Lock bags into paper bag 1. Place the group 2 Zip-Lock bags into paper bag 2. Repeat this pattern with all six paper grocery bags.
12. Place 5 2-quart buckets in each paper bag.
13. Place 1 potato masher in each paper bag.
14. Place 1 handheld strainer in each paper bag.
15. Place 5 sheets of newspaper in each paper bag.
16. Place 5 Zip-Lock bags containing waxed paper in the paper bag.

Support Document

Pre-class prep

Paper Pulp Prep

It's My Paper, And I Like It

Paper Making

Pre-class prep

Preparing the materials

Materials Needed

2	Newspapers
1	5-gallon bucket
1	Cross-cut shredder
1	Potato masher
1	Hand-held strainer
6	Plastic storage containers

The Day Before:

1. Using the cross-cut shredder, shred the newspaper (take out all of the inserts)
2. Put the shredded newspaper in the 5-gallon bucket.
3. Fill the bucket with water.
4. Let the paper soak overnight.

The day of:

5. Using the strainer, transfer the soaked paper into the 6 plastic storage containers.
6. Transfer some water into the 6 plastic storage containers.
7. Using the potato masher, create pulp from the newspaper. (it may be easier to mash with your hands)
8. Place the lid on the storage container.

Teaching Strategies

It's My Paper, And I Like It

Paper Making

Teaching Strategies

Lecture

This strategy is effective for all levels of learners.

During the lecture, an alternative may be to use the overhead (use student worksheet as a transparency)

Worksheets

Worksheets are provided to guide the students through the lesson. The lead teacher may prefer to have the students to take their own notes.

For below level learners and special ed, the teacher may consider having the worksheets filled out for these students. This would be done before class by the teacher or by having an advanced student help.

Group Makeup

Groups should be selected by the lead classroom teacher. The groups should be heterogeneous and learners of all levels should be included.

Group Discovery

The group work is effective for all levels of learners

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
60 minutes

It's My Paper, And I Like It

Paper Making

Objective

Students will construct a sheet of paper from discarded newspaper.

Materials Needed

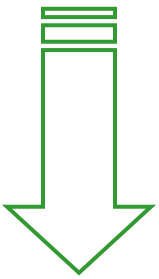
30	Single subject notebooks
6	Dry erase markers
1	White board
6	Pre-filled grocery bags with materials
2	newspapers

Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will construct a sheet of paper from discarded newspaper.

Distribute handouts (or workbooks).



Introduction:

"We are now going to make recycled paper."

Modeling / Guided Practice

1. The students should be divided into groups of 5.
2. Arrange the desks of each group to form one "square" table.

3. Have one student from each group come up to the front of the room to get a pre-packed paper bag containing a papermaking kit.

4. Have the students unfold the newspapers and cover the desktops.
5. Have the students place the plastic container containing the mashed paper pulp in the middle of their table and remove the lid.

6. The students should randomly select a Zip-Lock bag from the kit that contains the sponge, drywall patch, and marker.
7. Have the students with Zip-Lock bag #1 (bottom number) begin mashing the pulp in the plastic container.
8. After 1 minute, have the mashing student trade places with the student with Zip-Lock bag #2 to continue mashing.
9. This rotation should continue until all 5 students have had a turn at mashing.

10. Have the students arrange their 2-quart collection bucket in front of them.
11. Have the students place the drywall patches on top of the bucket.

12. Starting again with the student with Zip-Lock bag #1, have them scoop out paper pulp, using the handheld strainer, onto their drywall patch.
13. Water should drip from the pulp through the patch and down into the collection bucket.
14. Have the students use the sponge to help remove excess water and shape their new sheet of paper.
15. When student #1 has enough pulp, student #2 begins making their sheet of paper, and so on.

Modeling / Guided Practice

16. When the new sheet of paper is ready (somewhat squeezed dry of moisture), help the students transfer the new sheet of paper onto a piece of waxed paper.

17. When transferring the new sheet to the waxed paper, place the waxed paper on top of the recycled paper.
18. Lifting a corner of the recycled paper, the rest should peel off easily.

19. Have the students write their name on the piece of waxed paper with a marker.

20. Have the students put their materials back into their Zip-Lock bag.
21. Have the student dump the excess water from the collection bucket into the sink
22. Have the students replace their materials into the paper bag.
23. The lid of the plastic pulp container should be replaced.
24. Have the students bring the materials back up to the front of the room.

25. The newspaper on the desks should be collected and returned to the teacher for recycling.

Discussion

26. Draw attention to the color of the new paper. Discuss de-inking.
27. Ask the students to describe the pulp.

Closure:

1. Add any other facts that did not get presented.
2. Check for understanding.

Independent Practice

1. Not applicable for this lesson.

Support Document

It's My Paper, And I Like It

Paper Making

Discussion

We created pulp by mashing up old newspaper. If you looked closely at the water after the paper had been mashed, you would have noticed small fibers.

The paper turned out to be a gray color for 2 reasons:

1. Newspaper fiber is not bleached, so it has color to begin with
2. Newspaper has ink applied to it during printing.

As the paper was mashed, some of the ink came off of the paper.

We could have made the paper white by bleaching the pulp with hydrogen peroxide or with chlorine bleach.

Objectives: I will construct recycled paper from old newspapers.

Papermaking

Please describe, as best you can, the process that we used to make new paper (recycle) from old newspaper.

It's Organic, Man!

Lesson 13
Thoreau Think Piece

Writing Project / Assessment

Teaching Strategies

Thoreau Think Piece

Writing Project / Assessment

Teaching Strategies

Students with special needs

Small Group Discussion / Work

For below level learners and special ed, the teacher may consider grouping the students together. Read the instructions / rubric aloud and discuss. Help them put their thoughts on paper.

The discussion of individual questions/topics will allow all students to participate. It will also allow individual students to hear another classmate's ideas in a more relaxed setting (they will not be afraid of sharing information).

RAFT

A RAFT paper is a piece of writing that allows your students to process the information presented in the class in a creative way. In this lesson / assessment, the students will have 3 options to write from. The rubric should be applicable to all three assignments.

The RAFT is effective for all levels of learners.

Rubrics

The use of a detailed rubric will allow the students to understand exactly what they are being asked to do. In this lesson, there is one rubric that can be applied to all three writing options.

The rubric will allow the instructor to easily grade the student's work. For more advanced classes, the instructor may want the students to grade their own work.

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
60 minutes

Thoreau Think Piece

Writing Project / Assessment

"Simplicity, simplicity, simplicity!"

Henry David Thoreau
Walden

Objective

Students will write a RAFT paper to show mastery of the concepts presented in previous lessons.

Materials Needed

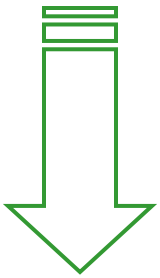
30	Workbooks (or handouts)
1	White board
1	Set of dry erase markers
30	Pieces paper
30	Sets colored pencils / crayons

Anticipatory Set

Write the lesson objectives on the white board.
Discuss with the students what the objectives of the lessons are.

Objective: You will write a RAFT paper to show mastery of the concepts presented in previous lessons.

Distribute handouts (or workbooks).



Introduction:

"Today we are going begin writing a paper called a RAFT paper. This assignment will be used as an assessment instead of a test."

EXPLAIN WHAT A RAFT PAPER IS.

"The project is going to cover all of the topics we have discussed in Module 2. Let's take a look at what is expected."

(Lessons 9-12)

Modeling / Guided Practice

1. Have the students focus their attention to the handouts (workbook).
2. Discuss what the final product (RAFT) should look like.
3. Present and discuss the rubrics that will be used to assess the student's work.
4. Allow the students the rest of the class period to work on the RAFT.
5. Remind the students to carefully read and follow the rubric.
6. Scaffold for support.

Closure:

1. Have the students clean up.
2. **The lesson will be continued next class period.**

Independent Practice

1. Not applicable for this lesson.

Teaching Strategies

Thoreau Think Piece

Writing Project / Assessment

RAFT

R – Role of the Writer

The student writes the paper in the role / character assigned by the teacher. In our example, the roles are: A piece of recycled paper, a compost pile, and a worm.

A – Audience

The student writes the paper to an assigned audience. In our example, the audiences are: A piece of recycled paper, micro-organisms, and a worm pen-pal.

F – Format

The student writes the paper in an assigned format. In our example, the formats are: A diary page, an advertisement, and a friendly letter.

T – Topic

The student writes the paper about an assigned topic. In our example, the formats are: How I became recycled paper, a vacation paradise, and an all about me.

Role	Audience	Format	Topic
Recycled Paper	Self	Diary Entry	Stages of becoming recycled paper
Compost Pile	Micro-organisms	Advertisement	A vacation paradise
Red Wiggler	Pen-Pal (worm)	Friendly letter	All about me

Solid Waste and Recycling Curriculum **Name:**_____

Lesson 13

Thoreau Think Piece **Date:**_____

Objectives: You will write a RAFT paper to show mastery of the concepts presented from previous lessons.

Topics to be covered by the RAFT:

- **Compost**
- **Vermicompost**
- **Paper Making**

RAFT

Role: Who are you as a writer?
Audience: Who are you writing to?
Format: What form will write in?
Topic: What is the subject of the writing?

Please select one of the following options:

Role: Piece of recycled paper **A**udience: Yourself **F**ormat: Diary Entry / Entries **T**opic: Describe how you were remade from old newspapers	**R**ole: Compost pile **A**udience: Micro-organisms **F**ormat: Full page magazine advertisement **T**opic: Try to convince micro-organisms that a compost pile is a great place for a vacation
Role: A Red Wiggler **A**udience: A pen-pal **F**ormat: A friendly letter **T**opic: All about me	

Solid Waste and Recycling Curriculum **Name:_____**

Lesson 13

Thoreau Think Piece **Date:_____**

Please refer to your notes if you have any questions about the content covered.

Please refer to the rubric if you have any questions about how the RAFT will be graded.

Thoreau Think Piece-- RAFT Rubric

	0	Needs Work 1	Approaching Expectations 2	Meets Expectations 3	Score Received
Role: How well did you interpret the character's voice you were writing in?	The author was never in character.	The author stayed in character for some of the piece.	The author stayed in character for most of the piece.	The author stayed in character for the entire piece.	
Format: Did you follow the format that corresponds to the role?	The author does not follow the writing form assigned			The author follows the writing form assigned.	
Audience: How well did you acknowledge the group or person you were writing for?	The audience is not acknowledged.	The audience was acknowledged in one place.	The audience is acknowledged in two separate places.	The audience is acknowledged in at least three separate places.	

Thoreau Think Piece-- RAFT Rubric

	0	Needs Work 1	Approaching Expectations 2	Meets Expectations 3	Score Received
Vocabulary: Did you use subject (topic) appropriate vocabulary?	The author does not use any vocabulary words.	The author uses one vocabulary word.	The author uses two vocabulary words.	The author uses at least three vocabulary words.	
Topic: How well did you prove that you learned about the topic?	The author does not include any facts.	The author includes at least two facts.	The author includes at least three facts.	The author includes at least four facts.	
Proper use of spelling, grammar, and punctuation.	The writer makes more than 4 errors in grammar or spelling.	The writer makes 3-4 errors in grammar or spelling.	The writer makes 1-2 errors in grammar and spelling.	Writer makes no errors in grammar or spelling.	

Thoreau Think Piece-- RAFT Rubric

Role	Points earned:
Format	Points earned:
Audience	Points earned:
Vocabulary	Points earned:
Topic	Points earned:
Spelling	Points earned:

Total points earned:	Total possible: **18**	Percent:

It's Organic, Man!

Lesson 14
Thoreau Think Piece

Writing Project / Assessment
Day 2

Teaching Strategies

Thoreau Think Piece

Writing Project / Assessment

Teaching Strategies

Students with special needs

Small Group Discussion / Work

For below level learners and special ed, the teacher may consider grouping the students together. Read the instructions / rubric aloud and discuss. Help them put their thoughts on paper.

The discussion of individual questions/topics will allow all students to participate. It will also allow individual students to hear another classmate's ideas in a more relaxed setting (they will not be afraid of sharing information).

RAFT

A RAFT paper is a piece of writing that allows your students to process the information presented in the class in a creative way. In this lesson / assessment, the students will have 3 options to write from. The rubric should be applicable to all three assignments.

The RAFT is effective for all levels of learners.

Rubrics

The use of a detailed rubric will allow the students to understand exactly what they are being asked to do. In this lesson, there is one rubric that can be applied to all three writing options.

The rubric will allow the instructor to easily grade the student's work. For more advanced classes, the instructor may want the students to grade their own work.

Tip: The student worksheet can be made as a transparency for group discussion.

Lesson Time:
60 minutes

Thoreau Think Piece

Writing Project / Assessment
Day 2

"Simplicity, simplicity, simplicity!"

Henry David Thoreau
Walden

Objective

Students will finish a RAFT paper to show mastery of the concepts presented in previous lessons.

Materials Needed

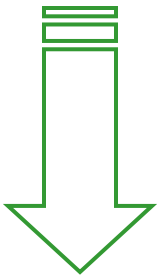
30	Workbooks (or handouts)
1	White board
1	Set of dry erase markers
30	Pieces paper
30	Sets colored pencils / crayons

Anticipatory Set

Write the lesson objectives on the white board. Discuss with the students what the objectives of the lessons are.

Objective: You will finish a RAFT paper to show mastery of the concepts presented in previous lessons.

Distribute handouts (or workbooks).



Introduction:

"Today we are going to finish writing our RAFT paper. This assignment will be used as an assessment instead of a test."

(Lessons 9-12)

Modeling / Guided Practice

1. Have the students focus their attention to the handouts (workbook).
2. Discuss what the final product (RAFT) should look like, IF NECESSARY.
3. Present and discuss the rubrics that will be used to assess the student's work, IF NECESSARY.
4. Allow the students the rest of the class period to work on the RAFT.
5. Remind the students to carefully read and follow the rubric.
6. Scaffold for support.

Modeling / Guided Practice

7. If the students have time, have them complete the puzzle worksheets in the following pages.

Closure:

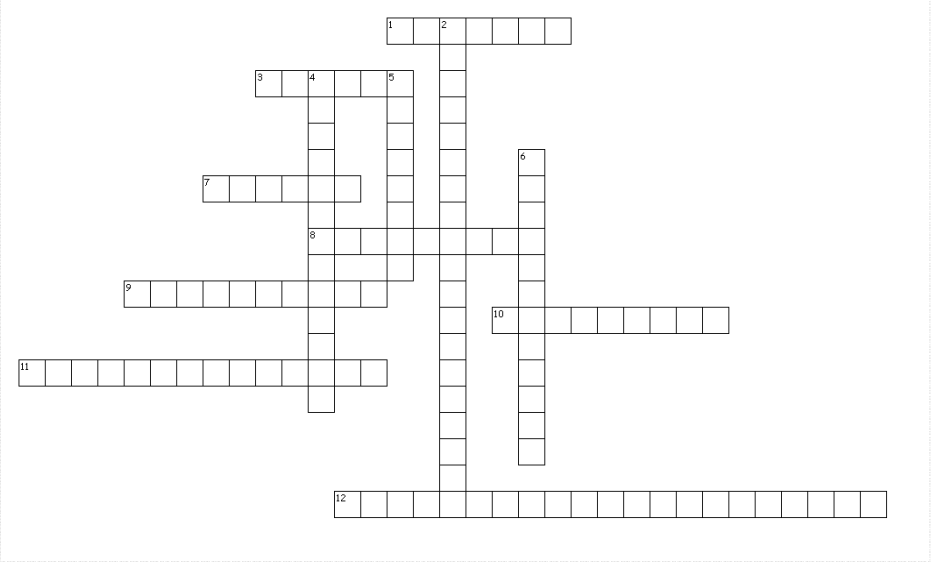
1. Prepare the students for the next module.

Independent Practice

1. Not applicable for this lesson.

Support Document

Puzzle Solutions



Across
1. the result of the process of decomposition of organic material
3. woody material
7. organic matter that has been freshly cut
8. the swollen section of a worm
9. materials breaking down through the use of microorganisms
10. the back end
11. help break down organic matter in a compost pile
12. study to find out the types and volume of our MSW

Down
2. trash generated by people and industry
4. food in the decomposition process
5. the rings that contract and expand during movement
6. composting with worms

12 of 12 words were placed into the puzzle.

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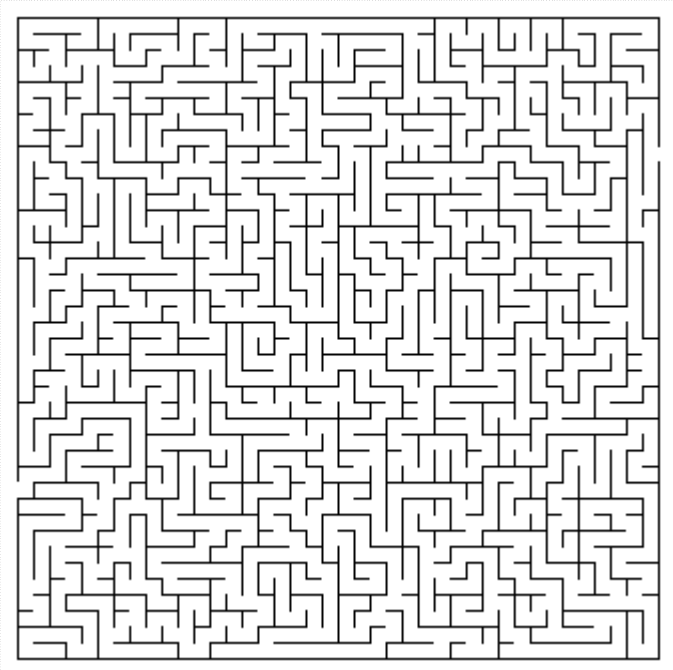
Crossword Key

Across
1. compost
3. browns
7. greens
8. clitellum
9. biodegrade
10. posterior
11. microorganisms
12. waste characterization

Down
2. municipal solid waste
4. organic matter
5. segments
6. vermicomposting



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Solid Waste and Recycling Curriculum **Name:**_____

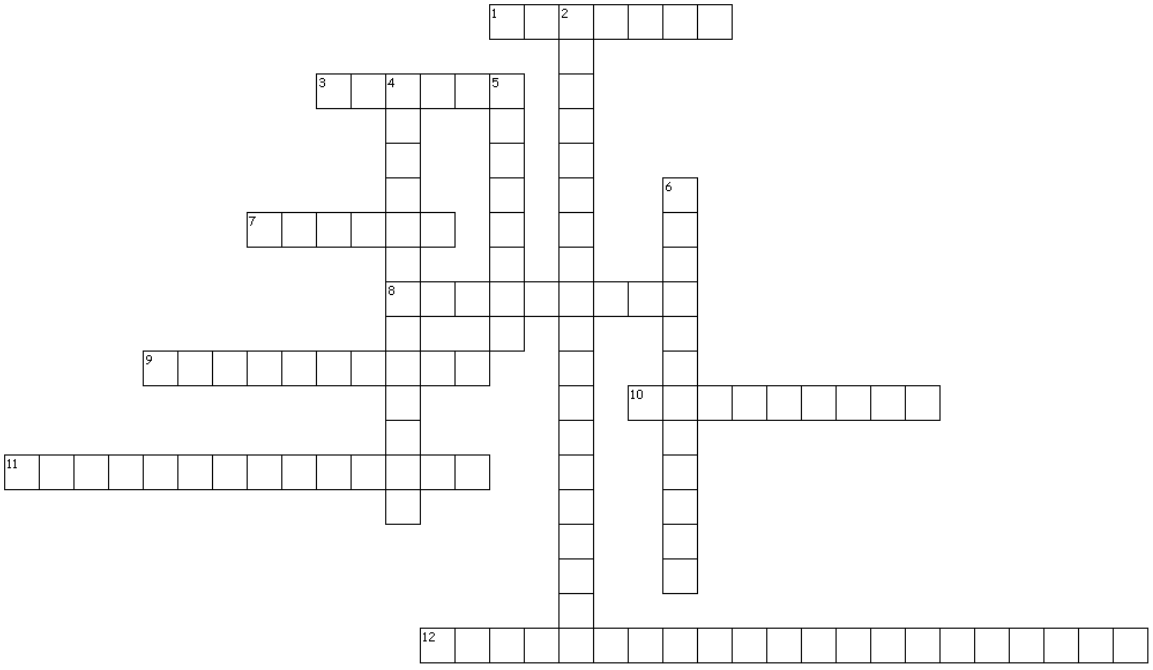
Lesson 14

Thoreau Think Piece: Day 2 **Date:**_____

Objectives: You will finish creating your RAFT paper.

While continuing work on the RAFT, please refer to the rubric presented in Lesson 13.

Please solve the following puzzles if you have completed your RAFT paper.



Solid Waste and Recycling Curriculum **Name:**_____

Lesson 14

Thoreau Think Piece: Day 2 **Date:**_____

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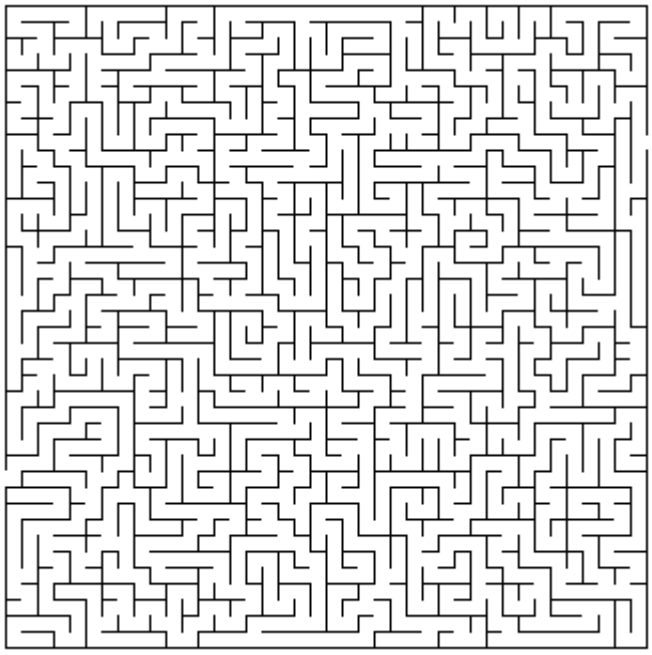

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